

## MINUTE MAN REFERENCE GUIDE

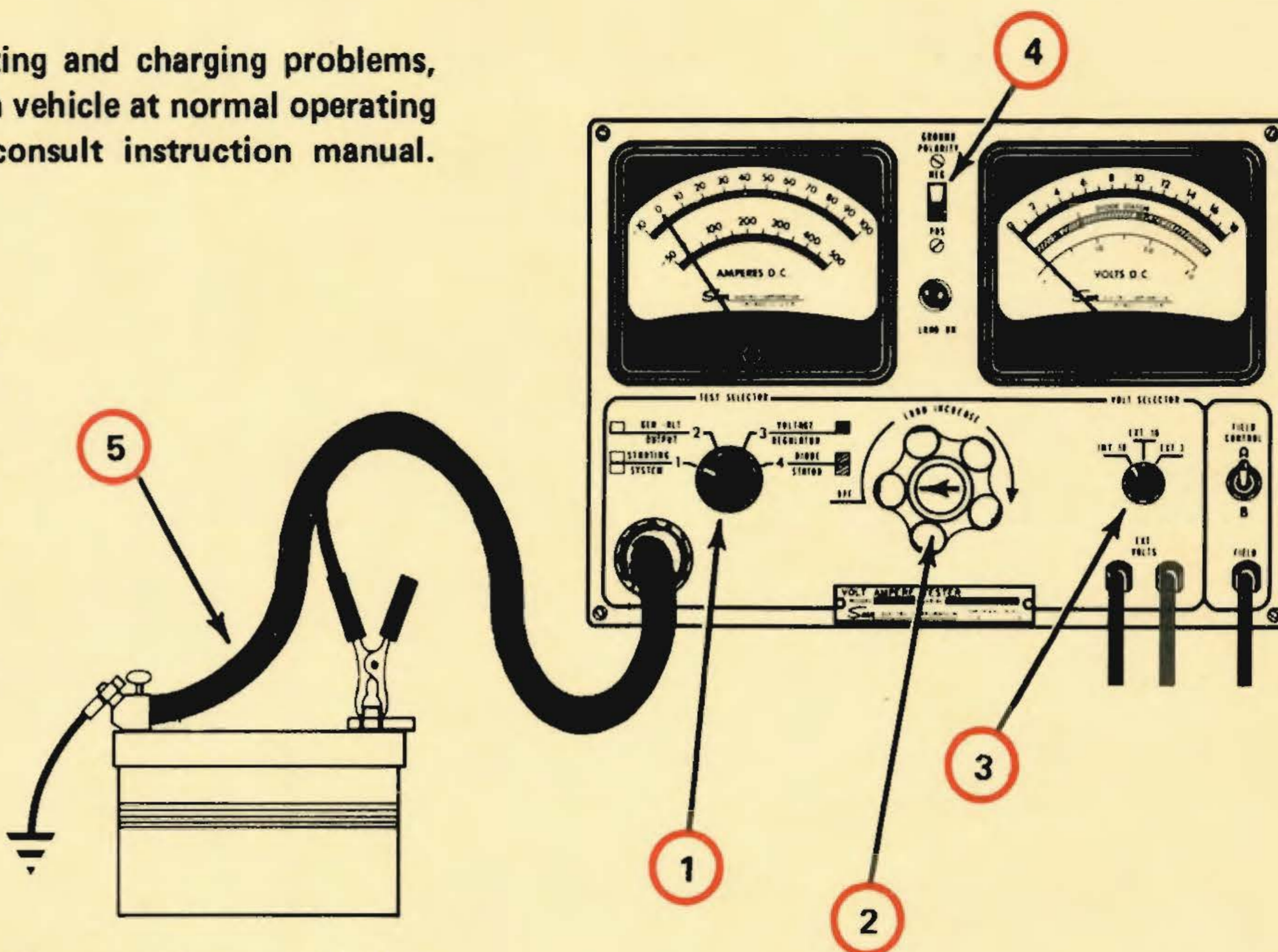
# TESTING STARTING AND CHARGING SYSTEMS

Using Sun MODEL VAT-28

This procedure will detect most starting and charging problems, using manufacturer's specifications with vehicle at normal operating temperature. For more information consult instruction manual.

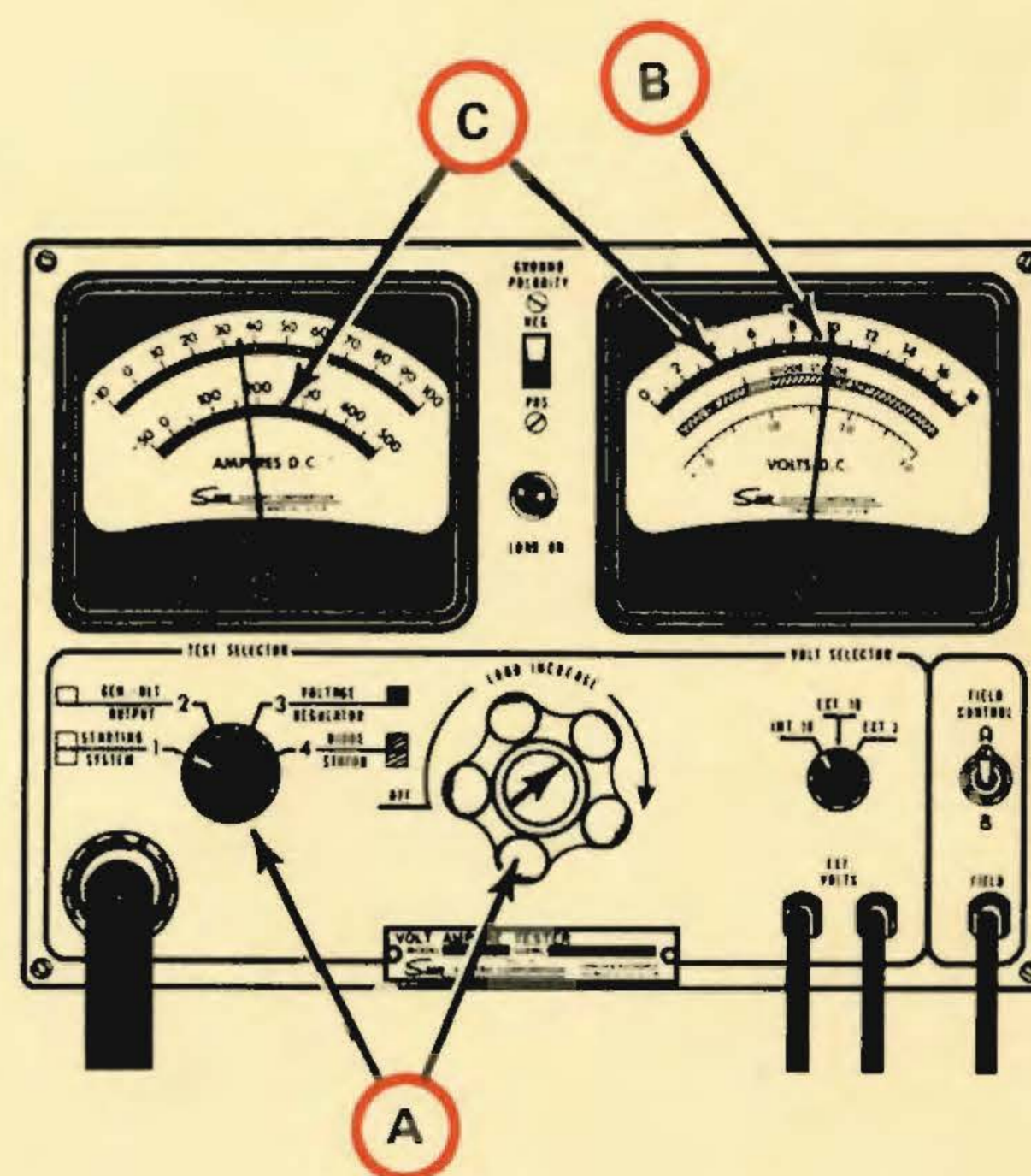
### HOOK UP

- 1 Set BLACK TEST SELECTOR to no.1 position.
- 2 Set BLUE LOAD CONTROL to "off".
- 3 Set RED VOLTMETER knob to INT. 18 position.
- 4 Set BLACK GROUND POLARITY switch to match battery polarity.
- 5 Connect tester harness to battery.
- 6 Turn off lights and all accessories.
- 7 Remove coil high tension wire from dist. cap and connect it to ground.



## 1. BATTERY PERFORMANCE AND STARTING SYSTEM TEST

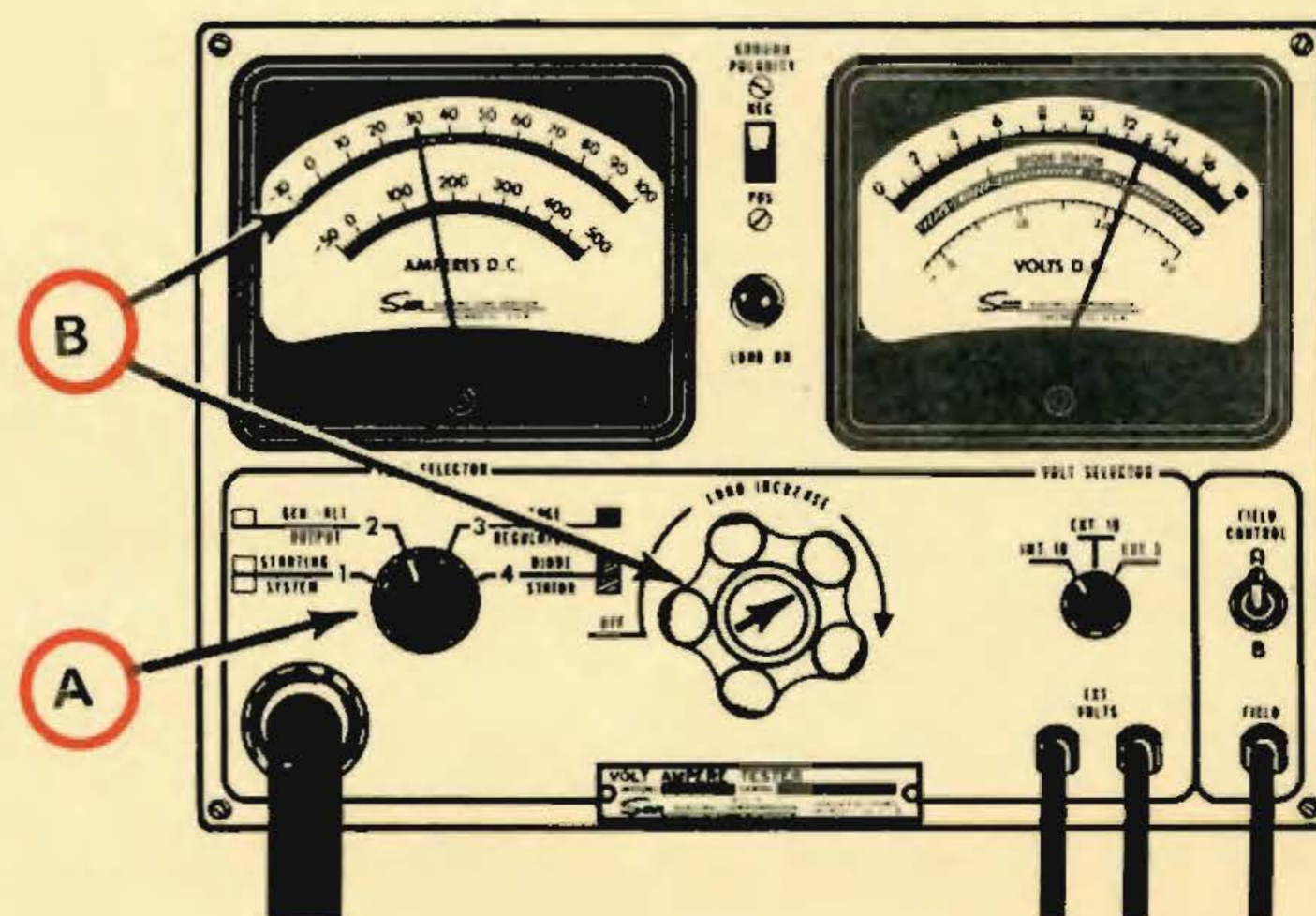
- A Turn BLUE LOAD CONTROL until RED AMMETER scale reads 3 times battery ampere hour rating. (Example: 60 Amp. hours x 3 = 180 Amperes.)
- B Maintain load for 15 seconds and observe GREEN VOLTMETER scale  
**Good 12-volt batteries will read 9.6 or more; 6-volt, 4.8 or more. If load voltage is below this specification, make a complete battery test.**
- C Crank engine while observing GREEN VOLTMETER scale and the RED AMMETER scale.  
If voltmeter reads less than 9.6 (4.8) check probability that battery A.H. rating is inadequate for vehicle.  
**Good starting systems usually read less than 250 amperes for eights, 180 amperes for sixes or fours, and have normal cranking speed.**



## 2. ALTERNATOR-GENERATOR OUTPUT TEST

Reconnect coil wire. Start engine and set speed at approximately 2,000 RPM.

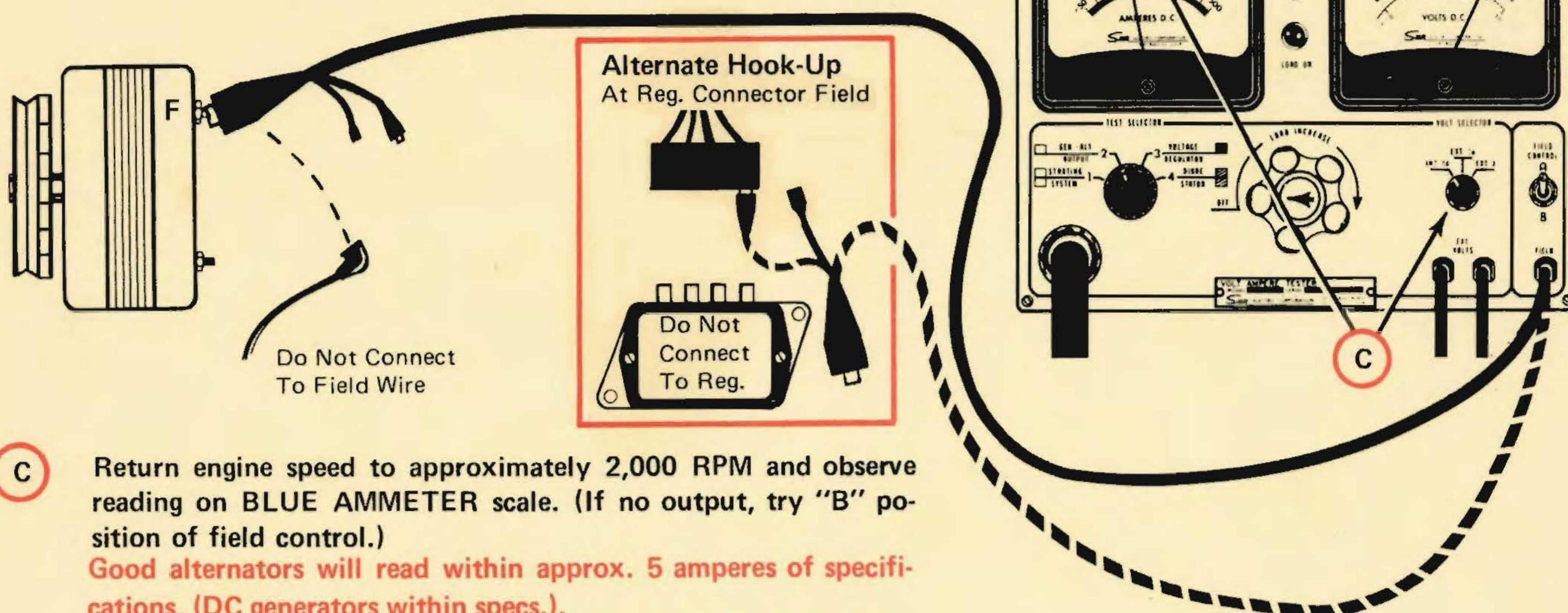
- A Set BLACK TEST SELECTOR to No.2 position.
- B Adjust BLUE LOAD CONTROL to obtain highest reading on the BLUE AMMETER scale. Return BLUE LOAD CONTROL to "off".  
**Good alternators will read within approx. 5 amperes of specs (DC generators within specs), if drive belt has proper tension. More than 5 amperes above spec for DC generator indicates faulty regulator.**



## 2A. OUTPUT TEST WITH FIELD CONTROL

(PERFORM ONLY IF TEST NO. 2 HAS FAILED.)

- Stop engine and disconnect Alternator or Generator field wire.
- Connect tester blue field lead to field of alternator or generator.

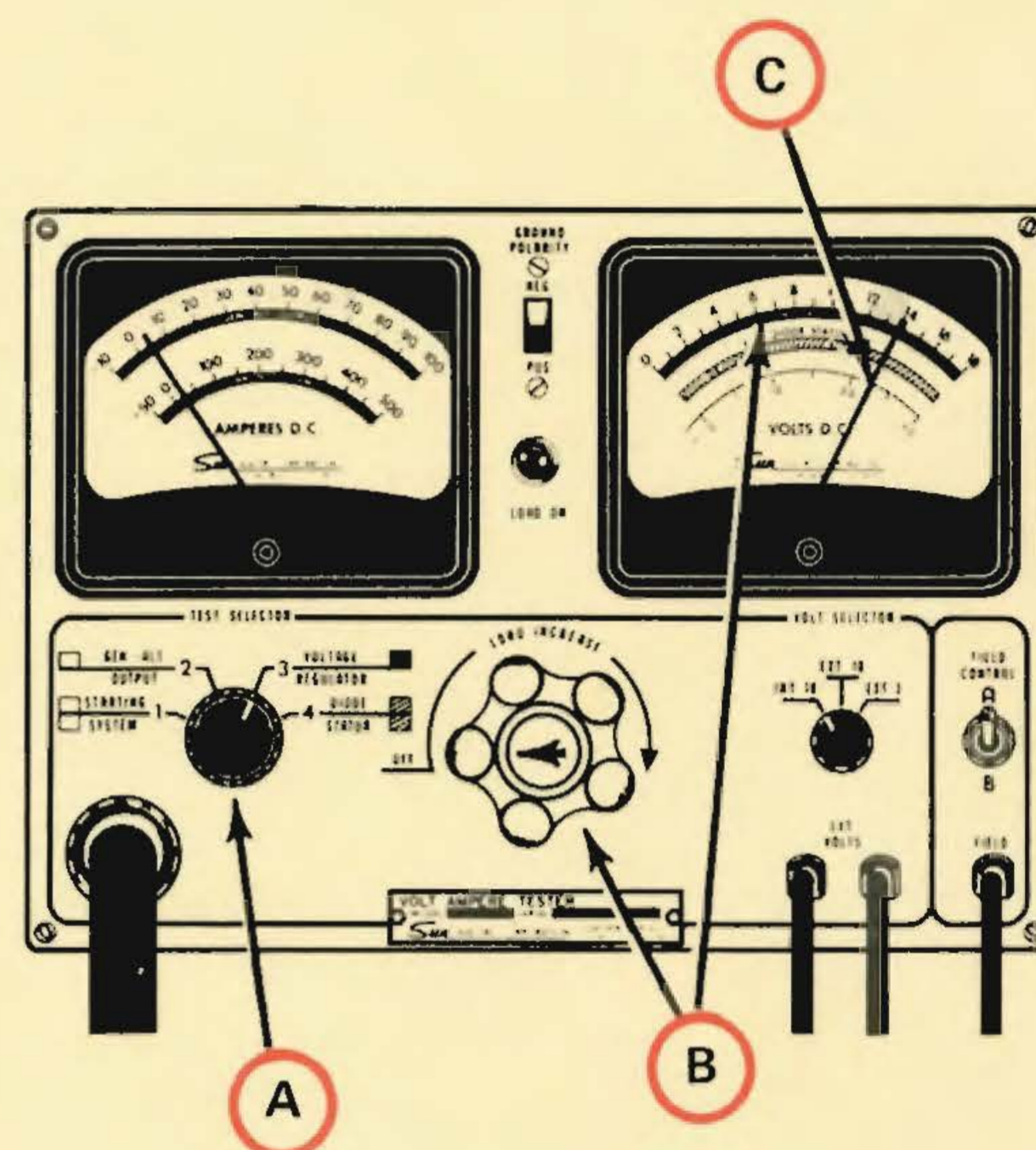


- Return engine speed to approximately 2,000 RPM and observe reading on BLUE AMMETER scale. (If no output, try "B" position of field control.)  
**Good alternators will read within approx. 5 amperes of specifications, (DC generators within specs.).**  
**Failing TEST No.2A indicates faulty alternator or generator.**  
**Passing TEST No.2A indicates a faulty regulator.**

## 3. VOLTAGE REGULATOR TEST

(PERFORM ONLY IF TEST NO. 2 IS PASSED SATISFACTORILY.)

- Set BLACK TEST SELECTOR to No.3 position.
- Idle engine and cycle regulator by rotating BLUE LOAD CONTROL until GREEN VOLTMETER scale reads one-half system voltage. Return BLUE LOAD CONTROL to "off". Return engine speed to approximately 2,000 RPM.
- Observe GREEN VOLTMETER scale.  
**Good regulator will read within manufacturer's specifications.**



## 4. DIODE-STATOR TEST

(PERFORM ONLY IF TEST NO. 3 IS PASSED SATISFACTORILY.)

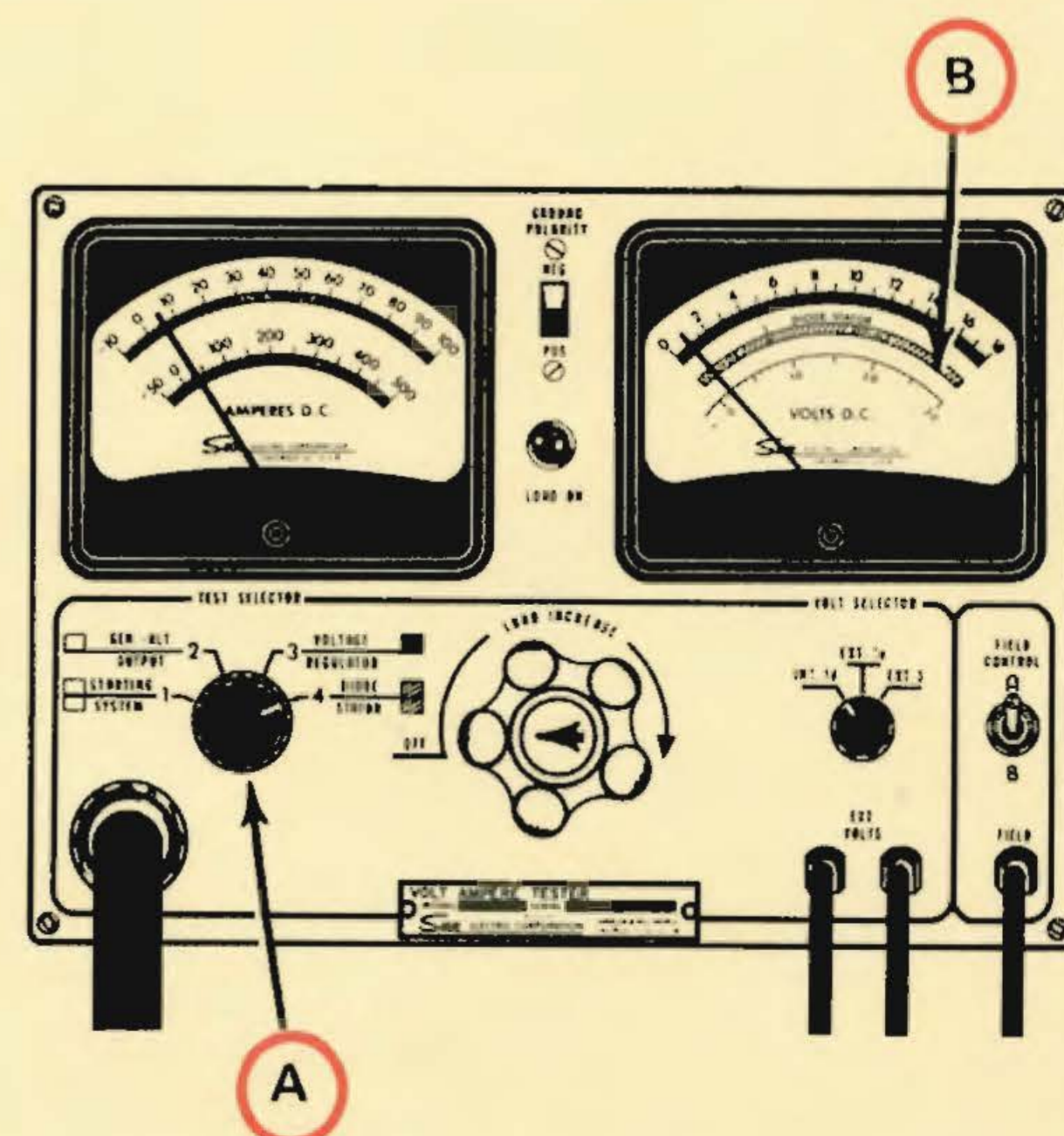
RETAIN ENGINE SPEED AT APPROX. 2,000 RPM

- Set BLACK TEST SELECTOR to No.4 position.
- Observe VOLTMETER scale with GREEN and RED SLASHES.  
**Good diodes and stator will read within the green area of scale.**

BATTERY DRAIN TEST (Optional)

Turn ignition switch and all accessories OFF. Close all doors. Set BLACK TEST SELECTOR to No.2 position. Observe BLUE AMMETER scale.

**Good electrical systems with no shorts or battery drains will read 0 amperes.**



# STARTING AND CHARGING SYSTEM DIAGNOSIS

CAR MAKE \_\_\_\_\_ YEAR \_\_\_\_\_ NO. OF CYLINDERS \_\_\_\_\_ VOLTAGE \_\_\_\_\_

## VISUAL INSPECTION

(At Time of Hook-Up)

1. Inspect connections and insulation of Battery Cables and wires.  
*Helps prevent starting failure.*
2. Inspect Gen.-Alt. Belt tension and condition.  
*Helps prevent road failure.*

GOOD BAD

☐ ☐☐ ☐

## 1. BATTERY PERFORMANCE AND STARTING SYSTEM TESTS—

- A. Load Battery until Red Ammeter scale reads three times A.H. rating for 15 seconds and observe green voltmeter scale. Minimum voltage should be \_\_\_\_\_ is \_\_\_\_\_. ABOVE MINIMUM: Battery performance is good. BELOW MINIMUM: Make complete battery test.

*Prevents unpredicted starting failure.*

- B. Crank engine while observing green Voltmeter scale and Red ammeter scale. Minimum voltage should be \_\_\_\_\_ is \_\_\_\_\_. Maximum amperes should be \_\_\_\_\_ is \_\_\_\_\_. If battery passed step A; but cranking voltage is low—make sure battery has sufficient capacity (A.H.) for this application. Good starters will read less than maximum cranking amperage specification with normal cranking speed—  
*A Must for easy starting.*

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## 2. ALTERNATOR-GENERATOR OUTPUT TEST—

- At approx. 2000 RPM. Good AC type charging system must be within 5 amperes of specifications (D. C. type within specs.) Output should be \_\_\_\_\_ is \_\_\_\_\_.

*The Charging system must supply sufficient current to operate the Ignition system and accessories while recharging the battery as you drive.*

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## 2A. OUTPUT TEST WITH FIELD CONTROL—

- At approx. 2000 RPM. (Used only if step 2 is bad). If output is O. K. now—bad regulator is indicated.

*This condition will cause battery failure.*

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## 3. VOLTAGE REGULATOR TEST—

At approx. 2000 RPM. (consult specifications)

Voltage should be \_\_\_\_\_ is \_\_\_\_\_.

*Low voltage lets the battery run down causing failure. High voltage causes premature failure of the battery, headlights, ignition, points, etc.*

GOOD BAD

☐ ☐

## 4. DIODE-STATOR TEST

Reading in Red slashed Band indicates bad Gen.-Alt. although step #2 may have passed.

*Insures Alt.-Gen. does not have hidden defects that will cause failure or damage to voltage regulator.*

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## PLUS! BATTERY DRAIN TEST-AMMETER MUST READ ZERO

(Doors must be closed with ignition switch and accessories off).

Ammeter reading \_\_\_\_\_.

*Safeguard against battery failure from discharging while vehicle is not in use.*

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## FINAL ANALYSIS

### Visual Inspection

**NEEDS:** \_\_\_\_\_

### Starting System

**NEEDS:** \_\_\_\_\_

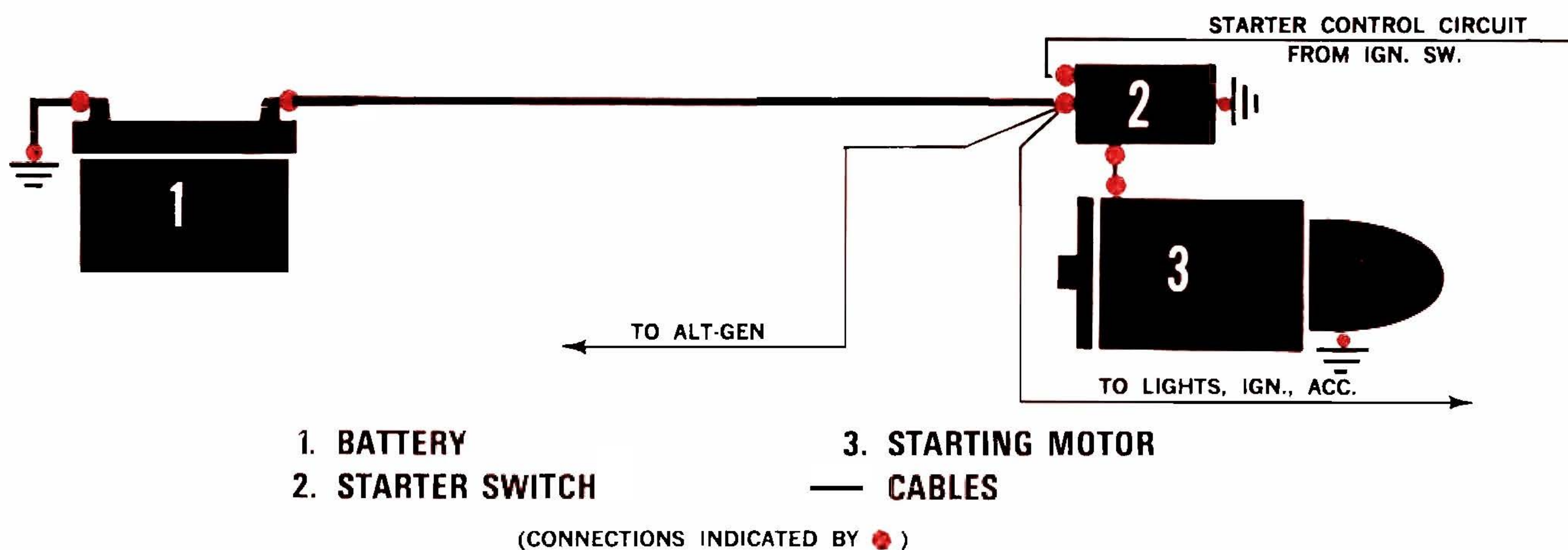
### Charging System

**NEEDS:** \_\_\_\_\_

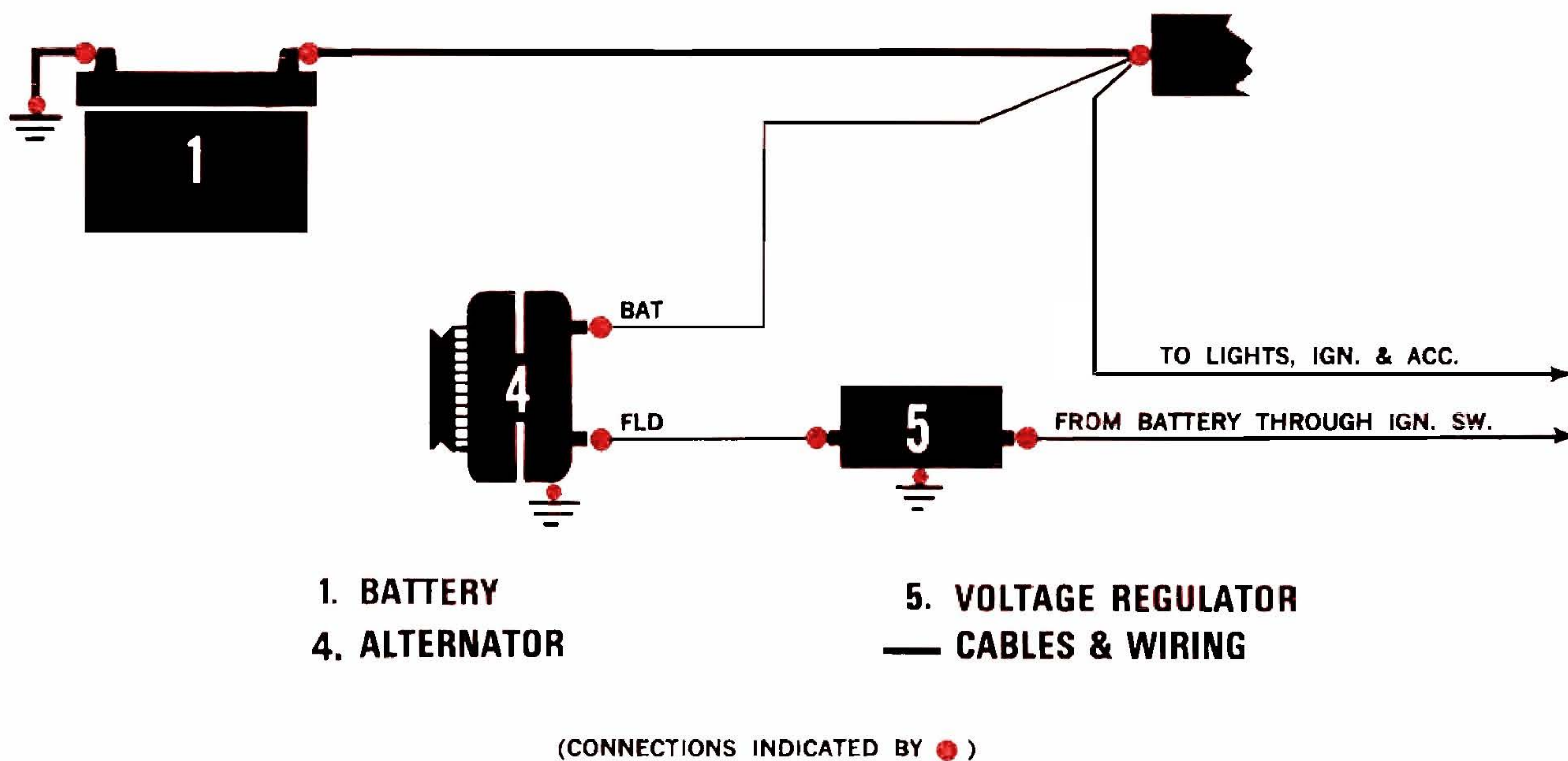
### Battery and/or Drains

**NEEDS:** \_\_\_\_\_

## TYPICAL STARTING SYSTEM



## TYPICAL A. C. CHARGING SYSTEM



## TYPICAL D. C. CHARGING SYSTEM

